

Hypothesis Test Project

Occasionally baseball broadcasts show a graphic about a certain pitcher's tendency to throw a strike on the first pitch. The announcers then usually attempt to help the viewer interpret this stat by loosely tying it to some measure of success or offering some sort of anecdote. I am skeptical of the claim that throwing a strike on the first pitch has an affect on a pitchers overall success and dominance in the long run. As a batter, it makes sense that you would like to stay ahead in the count, and to avoid getting in a count to the pitchers advantage. But I question how likely is a pitcher will go on to be successful, whatever that may be, in the event that they are pitching in an 0-1 count. My hypothesis is that by comparing the percentage of time a MLB pitcher has thrown a strike to various metrics of a pitchers command and success, this may show us the significance, or lack thereof, of throwing a first pitch strike.

My hypothesis are as follows:

$$H_0: \rho = 0; H_1: \rho \neq 0$$

My favorite baseball team is the Minnesota Twins. The Twins are a small market team with a relatively small payroll of around \$85 million and as an attempt to remain competitive with larger teams with more money, they actively train their players to throw lots of strikes. Even their scouts look for pitchers who they feel that they could develop into a pitcher with strong command.

I chose a significance level of 0.01. If you were a pitcher, coach, scout, or general manager, I feel that you would want to be very confident that a first pitch strike does in fact lead to a greater deal of success before promoting this tactic. For instance, if you

implemented this idea when in reality a first pitch strike does not lead to higher successes (Type 1 error), you would unnecessarily and recklessly be putting your team at risk by consistently throwing your first pitch in the zone where a hitter is more likely to be successful. Whereas if you failed to implement this idea, and throwing a first pitch strike is in fact an advantage for the pitcher (Type 2 error), you would be failing to give your team an advantage, but the extent to which this advantage actually helps your team may be marginal.

My target population was all major and minor league baseball pitchers. However the data I collected was for MLB pitchers, who pitched for more than 100 innings in 2014. I gathered my data off of baseball-reference.com

DATA

1st% - first pitch strike percent

WHIP – walks plus hits / innings pitched

ERA – earned run average

ERA+ - ballpark adjusted earned run average

Pit/PA – pitches / plate appearances

FIP – fielding independent pitching

H9 – hits per 9 innings pitched

SO9 – strikeouts per 9 innings pitched

BB9 – walks per 9 innings pitched

MINITAB

Regression Analysis: WHIP versus 1st%

Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Regression	1	0.8564	0.85640	47.70	0.000
1st%	1	0.8564	0.85640	47.70	0.000
Error	160	2.8725	0.01795		
Lack-of-Fit	94	1.8321	0.01949	1.24	0.181
Pure Error	66	1.0404	0.01576		
Total	161	3.7289			

Model Summary

S	R-sq	R-sq(adj)	R-sq(pred)
0.133990	22.97%	22.48%	21.02%

Coefficients

Term	Coef	SE Coef	T-Value	P-Value	VIF
Constant	2.453	0.173	14.17	0.000	
1st%	-1.954	0.283	-6.91	0.000	1.00

Regression Equation

WHIP = 2.453 - 1.954 1st%

ADDITIONAL DATA

	EQUATION	COEFFICIENT OF DETERMINATION (r ²)	CORRELATION COEFFICIENT	P-VALUE
WHIP v. 1st%	WHIP = 2.453 - 1.954 1st%	22.97%	-0.4793	0
ERA v. 1st%	ERA = 3.24 - 0.39 1st%	10.80%	-0.3286	0
ERA+ v. 1st%	ERA+ = 16.8 - 0.8 1st%	9.57%	-0.3094	0
Pit/PA v. 1st%	Pit/PA = 4.745 - 1.537 1st%	12.09%	-0.3477	0
FIP v. 1st%	FIP = 8.678 - 0.06 1st%	19.75%	-0.4444	0
H9 v. 1st%	H9 = 10.22 - 0.49 1st%	0.81%	-0.0900	0
SO9 v. 1st%	SO9 = 10.95 - 0.63 1st%	7.81%	0.2795	0
BB9 v. 1st%	BB9 = 11.733 - 1.489 1st%	44.01%	0.6634	0

We reject the null at the significance level of 0.01, the data support significant linear correlation between a pitcher's first pitch strike percentage and their WHIP, ERA, etc.

A potential bias in my results would arise from the fact that my sample was only pitchers in the MLB, and only pitchers who had pitched at least 100 innings. I believe this system could be effective in the minor leagues as well, but my data only included major league pitchers and so it is impossible to tell if this could be applicable outside of that sample. My sample also only included pitchers who threw at least 100 innings. This leaves out a large group of pitchers, relievers, and closers whose role on the team does not include throwing a lot of pitches or players who are not utilized as regularly as others, but still could potentially benefit from throwing a first pitch strike.

Given more resources, I would begin by establishing a database of stats for relievers, closers, and other pitchers with less prominent roles, but whose pitches are equally as important. Also, a database of stats for minor league pitchers would be useful as minor league and major league batters and hitters are very different. Lastly, the ability to isolate pitch type on each throw, (fastball, curveball, slider, etc.) would be a very helpful way to compare certain types of pitches to the success metrics measured above.